OPERATION

AND

SERVICE MANUAL

THIS MANUAL IS INTENDED TO SUPPLEMENT THE PREVIOUSLY SUPPLIED MANUAL. DO NOT DESTROY THE ORIGINAL MANUAL.

MODEL 3340 thru 3347 RF OUTPUT/ ATTENUATOR PLUG-IN UNIT

telonic™

TELONIC INSTRUMENTS

A Division of Telonic Industries, Inc.
60 N. First Avenue
Beech Grove, Indiana 46107

OPERATION
AND
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T.O.S. NO. 151D

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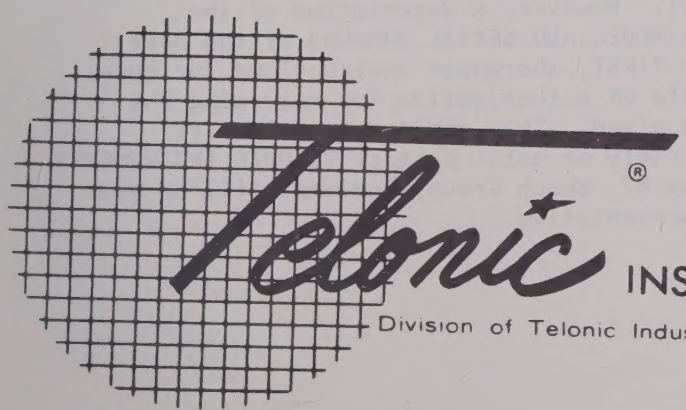

WARRANTY

TELONIC INSTRUMENTS AND ACCESSORIES

Products manufactured by TELONIC INSTRUMENTS; Division of Telonic Industries, Inc. are guaranteed against defective materials and workmanship for a period of one year (vacuum tubes excepted) from date of purchase. This warranty does not apply to instruments that have been altered, improperly handled or damaged in any way beyond our control.

Instruments must be examined immediately upon receipt, since claims for damage in transit will not be honored by the carrier unless prompt action is taken.

CHANGES IN SPECIFICATIONS

The right is reserved to change the published specifications of equipment at any time, and to furnish merchandise in accordance with current specifications, without incurring any liability to modify equipment previously sold.

RETURNING EQUIPMENT TO FACTORY

Factory service is available for repair and readjustment of this instrument. However, a description of the trouble, plus the MODEL AND SERIAL NUMBERS of the unit must be forwarded FIRST, whereupon instructions for correcting the trouble OR authorization for returning the equipment will be given. This applies to all units, whether under warranty or not. Contact TELONIC INSTRUMENTS at Post Office Box 87, Beech Grove, Indiana 46107 or your local TELONIC representative.

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SECTION I

GENERAL INFORMATION

1-1. SPECIFICATIONS.

1-2. Tables 1-1. thru 1-3. list the specifications for RF OUTPUT/ATTENUATOR PLUG-IN UNITS 3340 thru 3347.

TABLE 1-1.

3340/3342/3346 Specifications	
Attenuator:	
Frequency Range	
3340-	DC to 1000 MHz
3342-	DC to 900 MHz
3346-	DC to 400 MHz
Attenuation	
3340-	0-109 dB, 1 dB steps
3342-	0-59 dB, 1 dB steps
3346-	0-10.9 dB, 0.1 dB steps
Accuracy/Attenuation Steps	
0-30 MHz	
3340-	±2% or ±0.2 dB whichever is greater
3342-	±2% or ±0.2 dB whichever is greater
3346-	±2% or ±0.02 dB whichever is greater
30-400 MHz	
3340-	±3% or ±0.3 dB whichever is greater
3342-	±3% or ±0.3 dB whichever is greater
3346-	±3% or ±0.03 dB whichever is greater
400-Maximum Frequency	
3340-	±5% or ±0.5 dB whichever is greater
3342-	±5% or ±0.5 dB whichever is greater
Insertion Loss	
0-400 MHz	
3340-	less than 0.25 dB
3342-	less than 0.2 dB
3346-	less than 1.2 dB
400-Maximum Frequency	
3340-	less than 0.45 dB
3342-	less than 0.4 dB
RF Source Impedance	
3340-	50Ω with less than 1.35:1 VSWR to 1000 MHz
3342-	50Ω with less than 1.35:1 VSWR to 900 MHz

TABLE 1-1. (Cont)

3346-	50Ω with less than 1.25:1 VSWR to 400 MHz
External Marker Input Impedance	
3340/3342/3346-	50Ω
Power Rating	
3340-	1/2 Watt
3342-	1 Watt
3346-	1 Watt

TABLE 1-2.

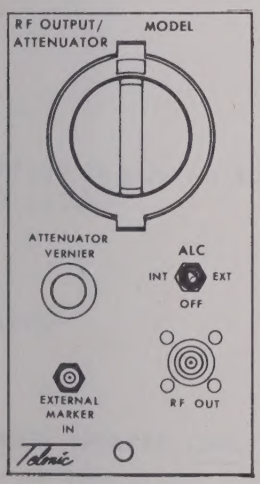
3341/3344 Specifications	
Attenuator:	
Frequency Range-	DC to 500 MHz
Attenuation-	0-62 dB, 1 dB steps
Accuracy/Attenuation Steps	
0-30 MHz-	±1% or ±0.2 dB whichever is greater
30-250 MHz-	±2.5% or ±0.2 dB whichever is greater
250-500 MHz-	±3.5% or ±0.3 dB whichever is greater
Insertion Loss	
0-250 MHz	
3341-	less than 0.5 dB
3344-	less than 0.5 dB
250-500 MHz	
3341-	less than 1 dB
3344-	less than 0.6 dB
RF Source Impedance	
0-250 MHz	
3341-	75Ω with less than 1.3:1 VSWR
3344-	50Ω with less than 1.25:1 VSWR
250-500 MHz	
3341-	75Ω with less than 1.4:1 VSWR
3344-	50Ω with less than 1.35:1 VSWR
External Marker Input Impedance	50Ω
Power Rating	1/4 Watt

TABLE 1-3.

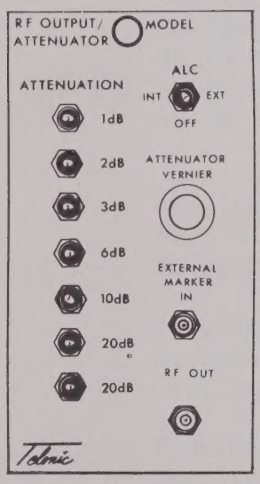
3343/3345/3347 Specifications	
Frequency Range	
3343-	DC-2000 MHz
3345-	DC-1000 MHz
3347-	DC-1000 MHz
RF Source Impedance	
3343-	50Ω with less than 1.2:1 VSWR to 2000 MHz
3345-	75Ω with less than 1.2:1 VSWR to 1000 MHz
3347-	60Ω with less than 1.2:1 VSWR to 1000 MHz
External Marker Input Impedance-	50Ω
Power Rating-	1/2 Watt

1-3. DESCRIPTION. (Refer to figure 1-1.)

1-4. RF OUTPUT/ATTENUATOR PLUG-IN UNITS 3340 thru 3347 are solid state units designed for use with the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS. These units provide positive and negative outputs to the leveler and generate a marker when an external marker source is used.



3340/3342/3346



3341/3344

3343/3345/3347

Figure 1-1. RF OUTPUT ATTENUATOR PLUG-IN UNITS

SECTION II

OPERATING INSTRUCTIONS

2-1. GENERAL.

2-2. This section provides the complete functional control description and operating instructions for RF OUTPUT/ATTENUATOR PLUG-IN UNITS 3340 thru 3347.

2-3. CONTROL PANEL DESCRIPTION.

2-4. FRONT PANEL. Table 2-1. provides a complete functional control description of all Front Panel Controls and Connectors.

TABLE 2-1.

Front Panel Control and Connector Functional Description	
Attenuator (3340/3342/3346) Fine-	Larger (outer) knob provides a control to vary attenuation from 0 to 9 dB in 1 dB steps (3340 and 3342) and from 0 to 0.9 dB in 0.1 dB steps (3346)
Coarse-	Smaller (inner) knob provides a control to vary attenuation from 0 to 100 dB in 10 dB steps (3340), from 0 to 50 dB in 10 dB steps (3342), and from 0 to 10 dB in 1 dB steps (3346)
ATTENUATION Toggle Switches (3341/3344)-	Provides a means to vary attenuation from 0 to 62 dB (in 1, 2, 3, 6, 10 or 20 dB steps)
ALC Switch-	Provides a means of selecting Internal Automatic Leveling, External Automatic Leveling, or OFF position
ATTENUATOR VERNIER Control-	Provides a means of varying Automatic Leveling; the range of this control is determined by the oscillator's Maximum and Minimum level controls
RF OUT Connector	Provides electrical connection for RF output to unit under test
EXTERNAL MARKER IN Connector-	Provides electrical connection for external marker signal source

2-5. Figure 2-1. provides a view of the three RF OUTPUT/ATTENUATOR Front Panel Control and Connector configurations.

TABLE 2-2.

Rear Panel Connector Functional Description	
P1	Provides electrical connection to the 2003 Control Chassis
RF Input	Provides electrical connection for RF input signal
Sweep Sample Outputs	Provide electrical connection for sweep sample outputs to the 2003 Marker Areas

2-7. PRE-OPERATION.

2-8. The following procedure must be performed before operating the 3340 thru 3347 RF OUTPUT/ATTENUATOR PLUG-IN UNITS.

CAUTION

Ensure that the 2003 POWER switch is in the OFF position before inserting RF OUTPUT/ATTENUATOR PLUG-IN UNIT.

a. Insert the RF OUTPUT/ATTENUATOR PLUG-IN UNIT into Area IV of the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS (refer to figure 2-3.) and tighten the front panel knurled fastening knob.

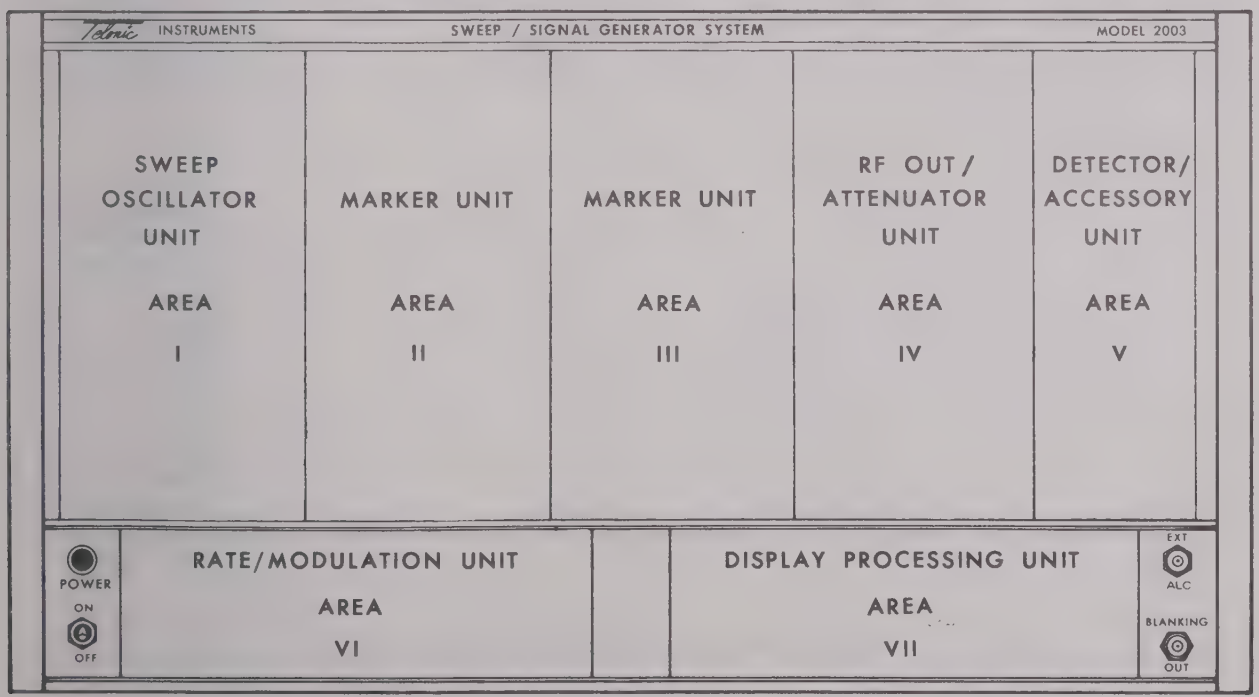


Figure 2-3. 2003 Plug-in Locations

b. Connect the 2003 to the unit under test as shown in figure 2-4.

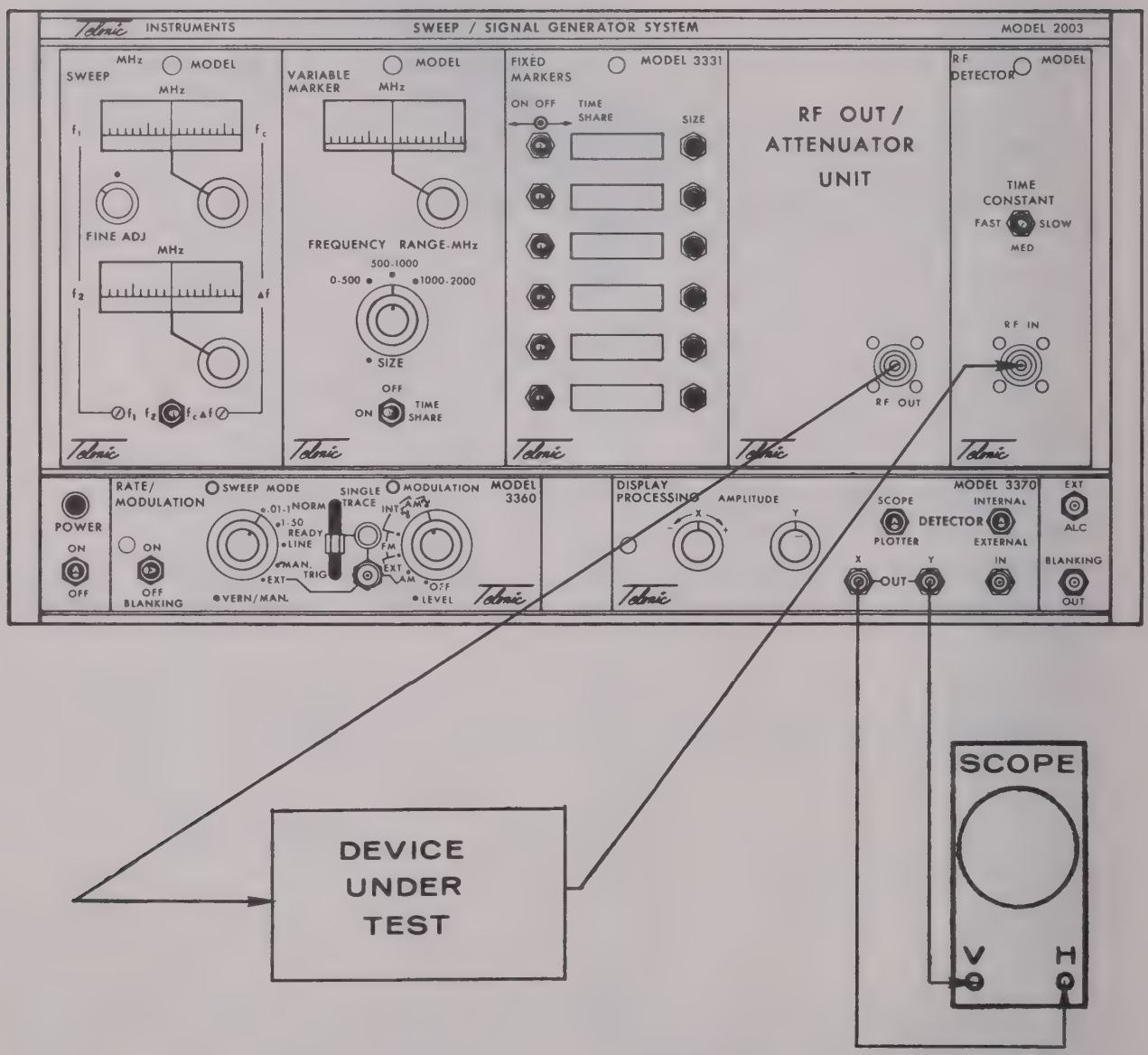


Figure 2-4. Typical Test Connections

2-9. OPERATING PROCEDURE.

a. Refer to the 2003 SWEEP/SIGNAL GENERATOR CONTROL CHASSIS OPERATION AND SERVICE MANUAL for 2003 operation.

b. Set the ALC switch to the desired position.

c. Adjust the Attenuator Controls or the ATTENUATION Toggle Switches for the desired attenuation.

d. Adjust the ATTENUATOR VERNIER for the desired output, (ALC switch in the INT or EXT position.).

SECTION III

PRINCIPLES OF OPERATION

3-1. GENERAL.

3-2. This section provides a brief description of the electrical circuits of RF OUTPUT/ATTENUATOR PLUG-IN UNITS 3340 thru 3347.

NOTE

Refer to appropriate schematic diagram located in Section V, when reading principles of operation.

3-3. Minimum and maximum level reference voltages are coupled in thru rear panel connector P1, pins 26 and 25 respectively. These voltages are applied to opposite ends of the ATTENUATOR VERNIER control resistor R1, and the reference output voltage is coupled from the center tap of resistor R1 to pin 23 of connector P1.

3-4. The RF sweep voltage input is coupled to the monitor from rear panel RF connector P2.

3-5. The monitor provides RF coupling to the attenuator, when present, thru impedance matching resistor R13.

NOTE

Models 3343, 3345, and 3347 do not use attenuators, therefore, RF coupling is directly to front panel connector J1.

3-6. The RF sweep voltage, whose attenuation is determined by the setting of the front panel attenuator control or attenuator switches, is coupled out thru RF OUT front panel connector J1.

3-7. Two RF Sweep Sample voltages from the monitor are coupled out thru rear panel connectors P3 and P4 to the 2003 CONTROL CHASSIS Marker Plug-in Areas.

3-8. The monitor mixer circuit consists of diode CR3 and resistors R11 and R12. The RF sweep voltage is coupled into the mixer thru resistor R4, capacitor C6, and resistor R10.

3-9. The external marker RF voltage, when present, is coupled from front panel RF connector P1 thru capacitor C5 to the mixer diode CR3.

3-10. The RF sweep voltage and the external marker RF voltage are heterodyned in the mixer and the resultant, difference frequency voltage, is coupled out thru pin 21 of the 36 pin rear panel connector.

3-11. A portion of the RF sweep voltage input is coupled thru resistor R5 to a full wave voltage doubler circuit consisting of capacitors C2 and C7, diodes CR1

and CR2, and resistor R6. Two DC voltages, + and - ALC, proportional to the RF input voltage are produced by the doubler circuit and coupled out thru feed-thru capacitors C4 and C8 to pins 27 and 28 of the 36 pin rear panel connector.

3-12. The ALC + and - voltages from switch S1 are fed thru the Oscillator Plug-in Unit and are coupled back to S1 thru the RF OUTPUT/ATTENUATOR rear panel 36 pin connector, pins 29 and 30.

3-13. ALC switch S1 is a double pole 3 position switch that determines whether: a. internal ALC voltage from the monitor is coupled out thru pins 32 and 36 of the 36 pin rear panel connector, b. external ALC voltage (negative only) from the 2003 front panel connector is coupled out thru pin 32 of the 36 pin rear panel connector, or c. no ALC voltage is coupled out.

SECTION IV

MAINTENANCE

4-1. GENERAL.

4-2. This section provides the necessary information to perform maintenance of the RF OUTPUT/ATTENUATOR PLUG-IN UNITS.

4-3. REQUIRED TEST EQUIPMENT.

4-4. The following test equipment will be required to perform maintenance on the RF OUTPUT/ATTENUATOR PLUG-IN UNITS:

a. Sweep/Signal Generator Control Chassis	Telonic Model 2003 or equivalent
b. Sweep Oscillator Plug-in Unit	Telonic Model 3305 or equivalent
c. Rate Modulation Plug-in Unit	Telonic Model 3360 or equivalent
d. Display Processing Plug-in Unit	Telonic Model 3370 or equivalent
e. RF Detector Plug-in Unit	
50Ω units-	Telonic Model 3350 or equivalent
75Ω units-	Telonic Model 3351 or equivalent
60Ω units-	Telonic Model 3352 or equivalent
f. Oscilloscope	Tektronix Model 503 or equivalent

4-5. PERFORMANCE CHECK.

4-6. This check may be used as a routine maintenance procedure or as an incoming inspection to verify performance of the RF OUTPUT/ATTENUATOR PLUG-IN UNITS.

4-7. INITIAL SETUP.

a. Connect the test equipment as shown in figure 4-1.

b. Set the test equipment controls as follows:

(1) POWER switch (2003)	ON
(2) BLANKING (3360)	ON
(3) SWEEP MODE (3360)	LINE
(4) SINGLE TRACE (3360)	NORM
(5) MODULATION (3360)	OFF
(6) SCOPE/PLOTTER Switch (3370)	SCOPE
(7) DETECTOR Switch (3370)	INTERNAL
(8) Mode Switch (3305)	f_1/f_2
(9) f_1-f_c Control (3305)	5 MHz
(10) f_2- f Control (3305)	Upper frequency limit of unit under test
(11) ALC Switch, unit under test	INT
(12) ATTENUATOR VERNIER, unit under test	fully clockwise
(13) ATTENUATION Switches or Attenuator Controls, unit under test	for 0 Attenuation

4-8. AUTOMATIC LEVELING OPERATION.

4-9. Observe the oscilloscope for a level display. Display amplitude is determined by the Maximum Level Adjustment of the 3305 SWEEP OSCILLATOR PLUG-IN

UNIT; refer to appropriate Operation and Service Manual for Maximum and Minimum Level Adjustment Procedures.

4-10. Slowly rotate the ATTENUATOR VERNIER Control in a counterclockwise direction and observe the oscilloscope for a waveform that decreases evenly across the screen to a minimum level determined by the Oscillator Minimum Level Adjust.

4-11. Set the ALC switch to the OFF position and observe the oscilloscope for an unleveled output across the band.

4-12. Set the ALC switch to the EXT position and observe the oscilloscope for an unleveled output across the band.

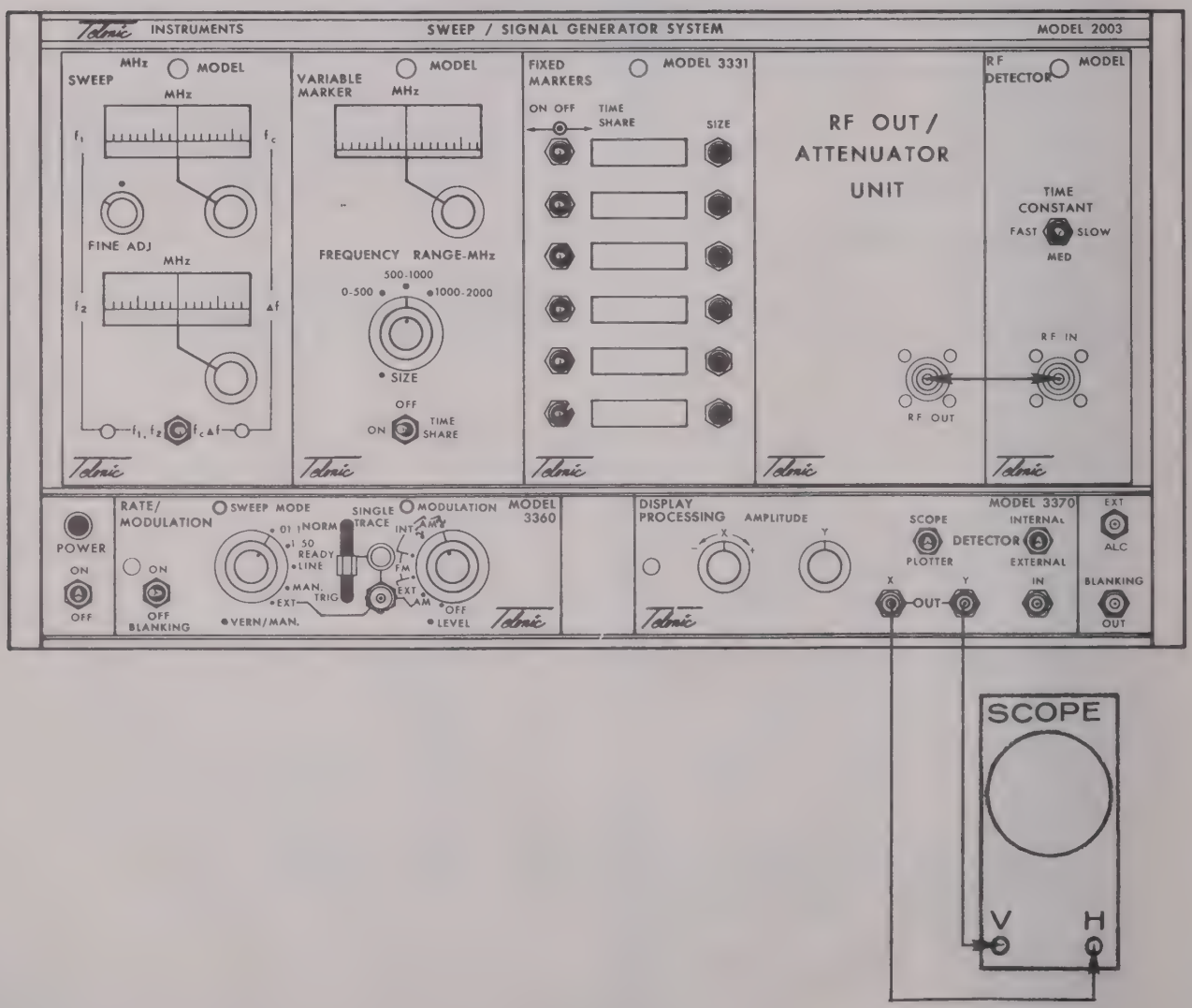


Figure 4-1. Typical Performance Test Connections

SECTION V

PARTS LIST AND SCHEMATIC DIAGRAMS

5-1. GENERAL.

5-2. This section provides the complete electrical parts list and a complete set of schematic diagrams required for maintenance of RF OUTPUT/ATTENUATOR PLUG-IN UNITS 3340 thru 3346.

5-3. SCHEMATIC DIAGRAMS.

5-4. The following schematic diagrams are included in this manual:

a.	Interconnection Schematic Diagram (3343/3345/3347)	Figure 5-1A
b.	Interconnection Schematic Diagram (3340/3341/3342/3344/3346)	Figure 5-1B
c.	Monitor Mixer Schematic Diagram	Figure 5-2

5-5. All resistors are shown in ohms unless otherwise specified.

5-6. All capacitors are shown in picofarads unless otherwise specified.

5-7. ABBREVIATION CODE.

5-8. Table 5-1. specifies the abbreviations used for components in the parts lists.

TABLE 5-1.

Abbreviation Code	
CFC	Capacitor, Fixed, Ceramic
CFCF	Capacitor, Fixed, Ceramic, Feed-thru
CFD	Capacitor, Fixed, Discap
DS	Diode, Semiconductor
RFC	Resistor, Fixed, Composition
RFCF	Resistor, Fixed, Carbon Film
RFMF	Resistor, Fixed, Metal Film
RVC	Resistor, Variable, Composition
SWT	Switch, Toggle

5-9. PARTS LIST.

5-10. Tables 5-2. thru 5-4. provide the complete electrical parts list for the RF OUTPUT/ATTENUATOR PLUG-IN UNITS.

Electrical Parts List				
Monitor Schematic Diagram (Assembly No. 970321)				
Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFC, 0.18pF, 500VDCW	Quality Components	Q.C.-0.18	22-0009-05
C2	CFD, 1000pF, 1000VDCW	Aerovox	5506-0012	21-0040-01
C3	Same as C1			
C4	CFCF, 1000pF, 500VDCW	Allen-Bradley	Type FA5C	21-0016-01
C5	CFC, 150pF, 1000VDCW	Radio Materials Corp	Type C	22-0003-03
C6	CFC, 25pF, 1000VDCW	Radio Materials Corp	Type C	22-0001-09
C7	Same as C2			
C8	Same as C4			
C9	Same as C4			
CR1	DS, 1N82A	Kemtron	1N82A	41-0105-01
CR2	Same as CR1			
CR3	Same as CR1			
P1	Receptacle, Elect	Dage	2559-1	44-0011-01
P2	Receptacle, Elect	Dage	4961-1	44-0023-01
P3	Same as P2			
P4	Same as P2			
P5*	Receptacle, Elect (3341)	Amphenol	27-19	44-0184-01
	Receptacle, Elect (3344)	Amphenol	27-7	44-0183-01
	Plug, Elect (3340/3342/3343/ 3345/3346/3347)	Dage	8000-1	44-0037-01
R1	RFC, 220Ω, ±10%, 1/4W	Allen-Bradley	CB2211	26-1501-01
R2	RFC, 680Ω, ±5%, 1/4W	Allen-Bradley	CB6815	26-1578-01
R3	RFC, 47Ω, ±10%, 1/4W	Allen-Bradley	CB4701	26-1530-01
R4	RFC, 120Ω, ±10%, 1/4W	Allen-Bradley	CB1211	26-1597-01
R5	RFC, 100Ω, ±10%, 1/4W	Allen-Bradley	CB1011	26-1522-01
R6	Same as R5			
R7	Same as R1			
R8	Same as R2			
R9	RFC, 22kΩ, ±10%, 1/4W	Allen-Bradley	CB2231	26-1518-01
R10	RFC, 1.2kΩ, ±10%, 1/4W	Allen-Bradley	CB1221	26-1593-01
R11	Same as R3			
R12	RFC, 1kΩ, ±10%, 1/4W	Allen-Bradley	CB1021	26-1528-01
R13*	RFCF, 75Ω, ±1%, 1/4W (3341/3345)	Electra Mfg.	DC 1/4A	27-0001-01
	RFMF, 49.9Ω, ±1%, 1/2W (3340/3342/3343/ 3344/3346)	IRC	CEC T-0	27-0254-01
R14	RFCF, 60.4Ω, ±1%, 1/2W (3347)	Electra Mfg.	DC 1/2C	27-2563-01

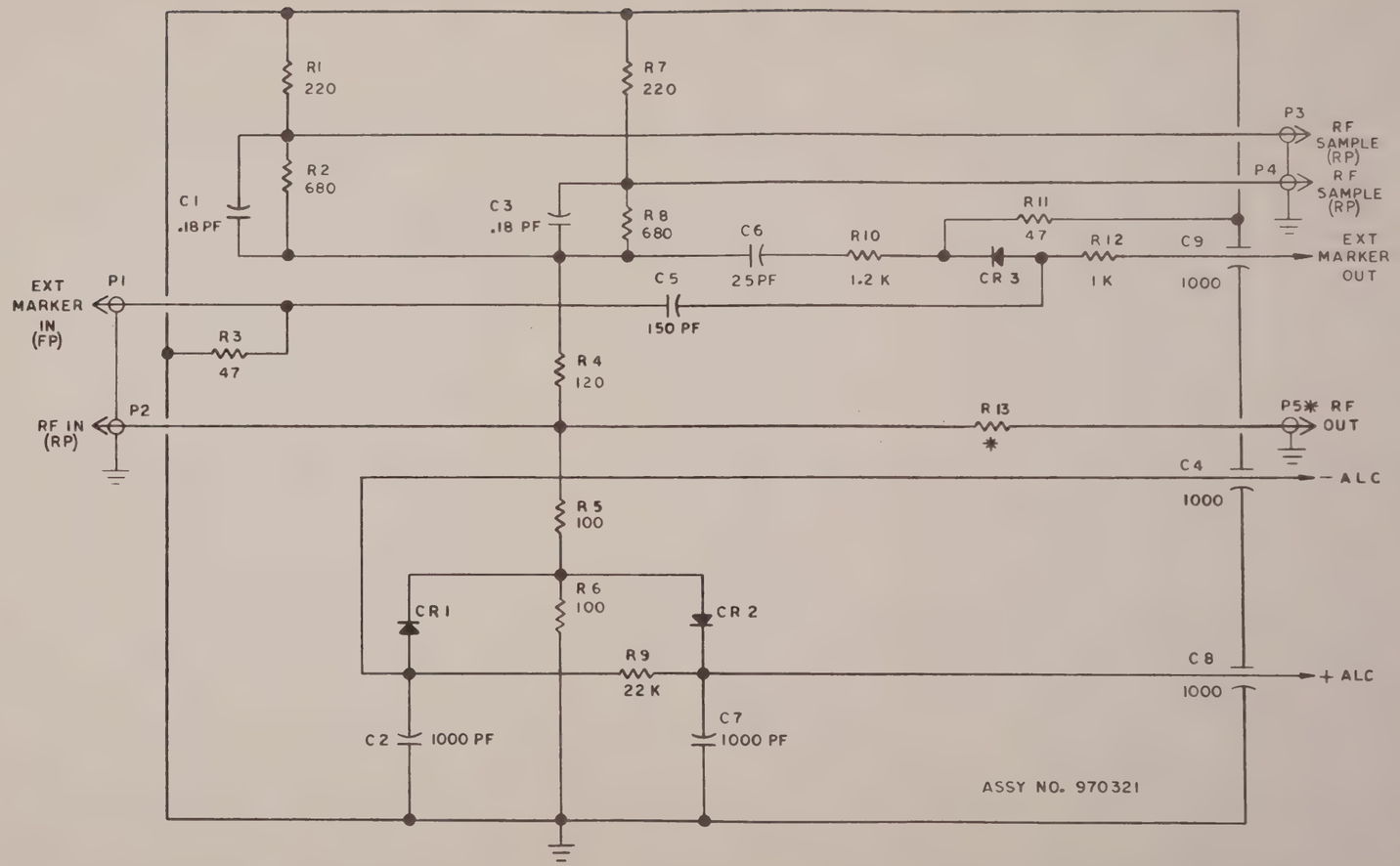
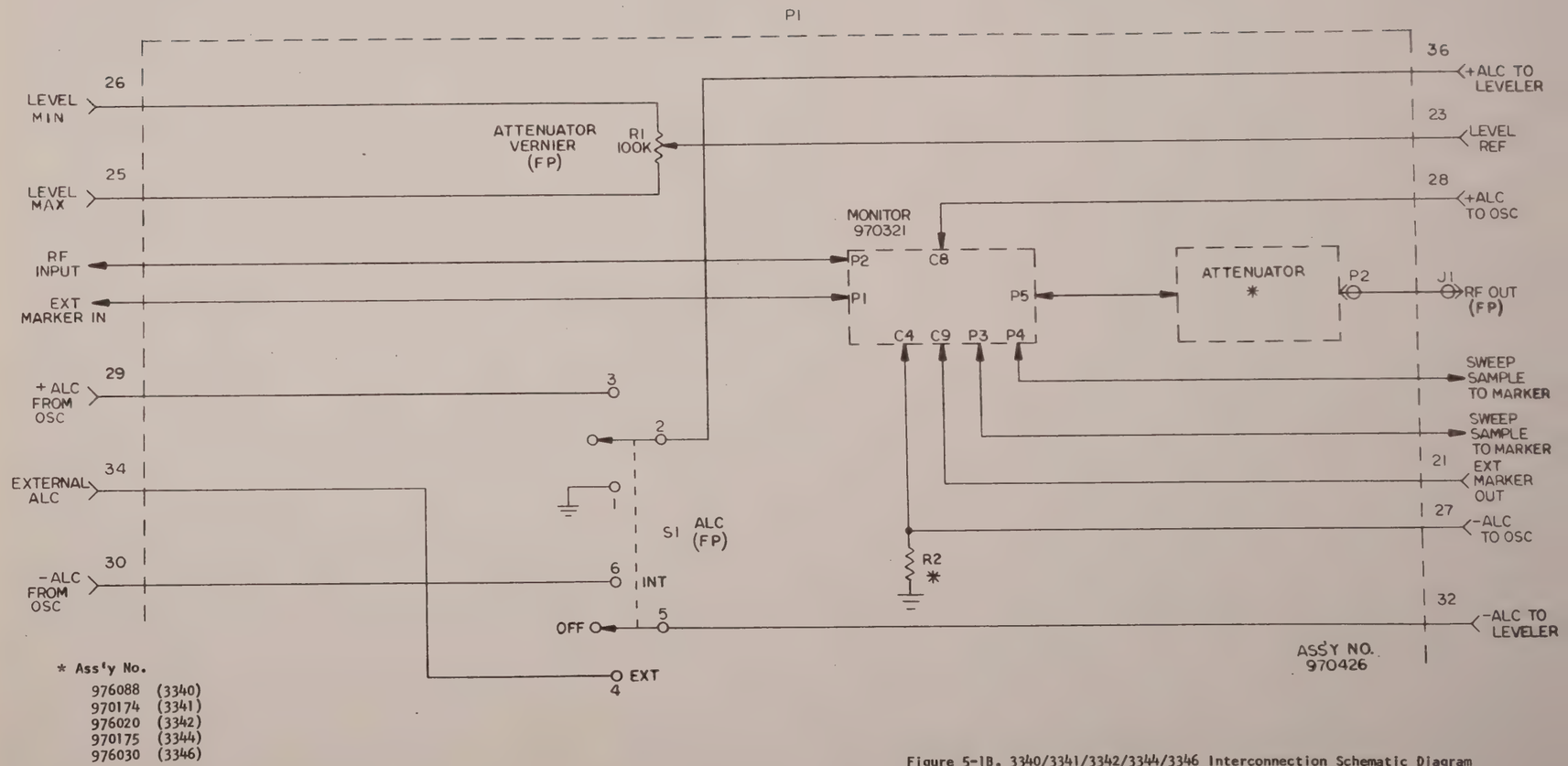


Figure 5-2. Monitor/Mixer Schematic Diagram

Electrical Parts List				
Interconnection Schematic Diagram				
Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
J1	Receptacle, Elect 3340/3342/3346	Dage	3475-1	44-0049-01
	Receptacle, Elect 3344	Amphenol	27-7	44-0183-01
	Receptacle, Elect 3341	Telonic		44-0197-01
P1	Plug, Elect	Amphenol	57-20360	44-0186-01
P2	Receptacle, Elect 3340/3342/3346	Dage	8000-1	44-0037-01
	Receptacle, Elect 3341	Amphenol	27-19	44-0184-01
	Receptacle, Elect 3344	Dage	P-0 Type	44-0086-01
R1	RVC, 100kΩ, 1/3W	CTS	45ER9747	29-0001-03
R2*	Value determined by frequency response			
S1	Switch, DPTT	Alcoswitch	MST 205P	37-0127-01



* Ass'y No.
976088 (3340)
970174 (3341)
976020 (3342)
970175 (3344)
976030 (3346)

Figure 5-1B. 3340/3341/3342/3344/3346 Interconnection Schematic Diagram

Electrical Parts List				
Monitor Schematic Diagram (Assembly No. 970321)				
Circuit Ref	Description	Typical Manufacturers	Manufacturers Part No.	Telonic Part No.
C1	CFC, 0.18pF, 500VDCW	Quality Components	Q.C.-0.18	22-0009-05
C2	CFD, 1000pF, 1000VDCW	Aerovox	5506-0012	21-0040-01
C3	Same as C1			
C4	CFCF, 1000pF, 500VDCW	Allen-Bradley	Type FA5C	21-0016-01
C5	CFC, 150pF, 1000VDCW	Radio Materials Corp	Type C	22-0003-03
C6	CFC, 25pF, 1000VDCW	Radio Materials Corp	Type C	22-0001-09
C7	Same as C2			
C8	Same as C4			
C9	Same as C4			
CR1	DS, 1N82A	Kemtron	1N82A	41-0105-01
CR2	Same as CR1			
CR3	Same as CR1			
P1	Receptacle, Elect	Dage	2559-1	44-0011-01
P2	Receptacle, Elect	Dage	4961-1	44-0023-01
P3	Same as P2			
P4	Same as P2			
P5*	Receptacle, Elect (3341)	Amphenol	27-19	44-0184-01
	Receptacle, Elect (3344)	Amphenol	27-7	44-0183-01
	Plug, Elect (3340/3342/3343/ 3345/3346/3347)	Dage	8000-1	44-0037-01
R1	RFC, 220Ω, ±10%, 1/4W	Allen-Bradley	CB2211	26-1501-01
R2	RFC, 680Ω, ±5%, 1/4W	Allen-Bradley	CB6815	26-1578-01
R3	RFC, 47Ω, ±10%, 1/4W	Allen-Bradley	CB4701	26-1530-01
R4	RFC, 120Ω, ±10%, 1/4W	Allen-Bradley	CB1211	26-1597-01
R5	RFC, 100Ω, ±10%, 1/4W	Allen-Bradley	CB1011	26-1522-01
R6	Same as R5			
R7	Same as R1			
R8	Same as R2			
R9	RFC, 22kΩ, ±10%, 1/4W	Allen-Bradley	CB2231	26-1518-01
R10	RFC, 1.2kΩ, ±10%, 1/4W	Allen-Bradley	CB1221	26-1593-01
R11	Same as R3			
R12	RFC, 1kΩ, ±10%, 1/4W	Allen-Bradley	CB1021	26-1528-01
R13*	RFCF, 75Ω, ±1%, 1/4W (3341/3345)	Electra Mfg.	DC 1/4A	27-0001-01
	RFMF, 49.9Ω, ±1%, 1/2W (3340/3342/3343/ 3344/3346)	IRC	CEC T-0	27-0254-01
R14	RFCF, 60.4Ω, ±1%, 1/2W (3347)	Electra Mfg.	DC 1/2C	27-2563-01

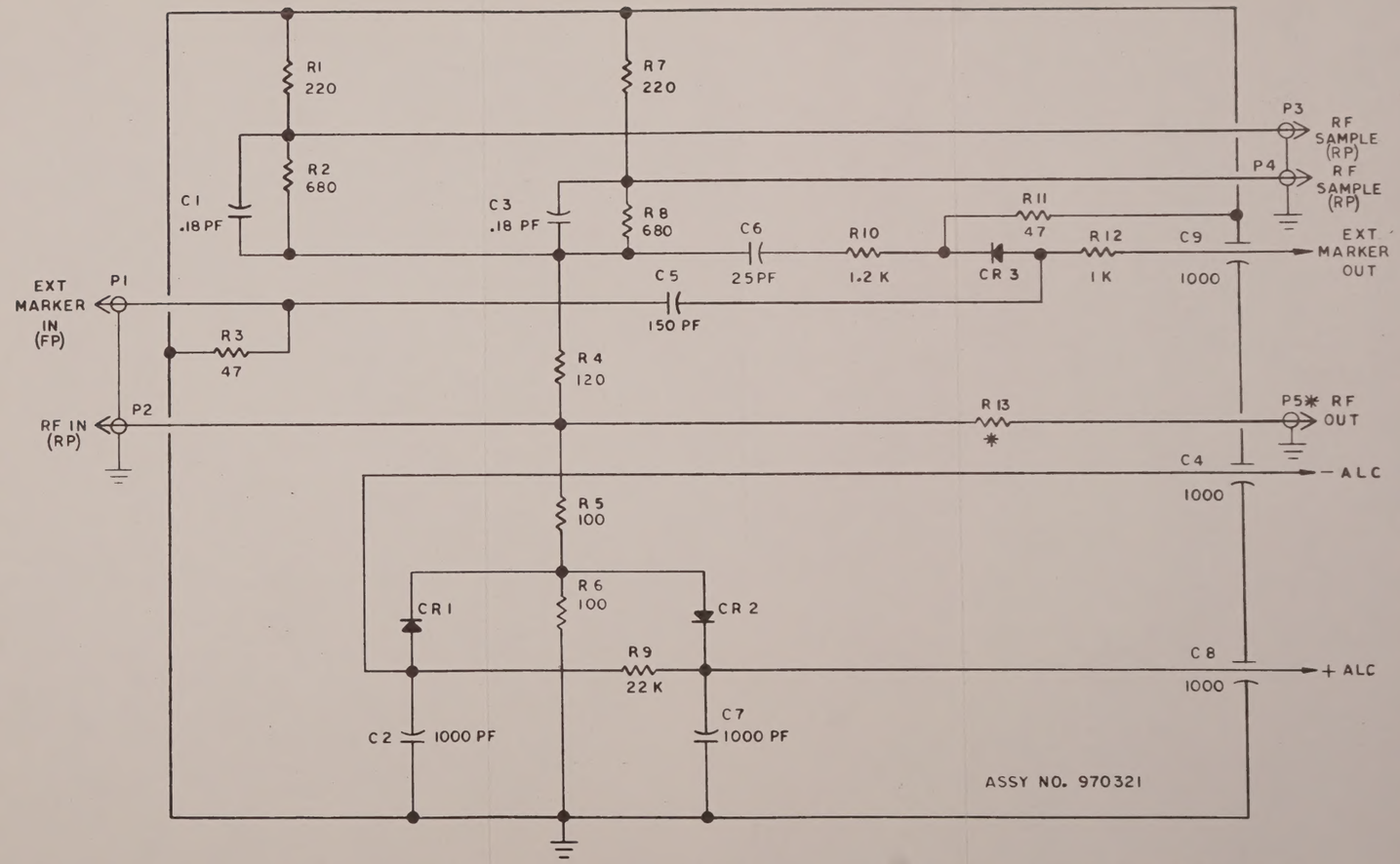


Figure 5-2. Monitor/Mixer Schematic Diagram

THIS MANUAL IS INTENDED TO SUPPLEMENT THE PREVIOUSLY SUPPLIED MANUAL. DO NOT DESTROY THE ORIGINAL MANUAL.